



Using Algebraic Expressions to Calculate Touring Costs

OVERVIEW

ESSENTIAL QUESTION

How can writing and evaluating algebraic expressions be used to anticipate a musician's touring costs?

OVERVIEW

In this lesson, students practice creating multi-step operations to solve real-life problems related to touring costs. Using Jackson Browne's 1978 tour as a case study, students calculate the fuel costs associated with touring. Students then role play as band members going on their first national tour, and create a budget taking into account some touring costs. As an extension activity, they consider the costs and benefits associated with more sustainable means of transportation, such as biodiesel and electric vehicles.



Touring is one of the primary avenues available to musicians seeking to make a living. In fact, with streaming providing even less money to artists than physical record sales, selling tickets and merchandise on the road has, for the majority of musicians, become a necessity.

As groups like the Grateful Dead have demonstrated, touring alone offers the possibility to propel musicians into stardom—but it's no guarantee. Traveling from city to city is expensive: musicians need to consider transportation costs, food, lodging, as well as budget for unknown expenses such as vehicle breakdowns and cancelled concerts. Negotiating these touring costs, in addition to constant travel and performing, can also be emotionally and physically draining for musicians on the road.

One of the most iconic works that examines the stresses of a musician “on the road” is Jackson Browne’s 1977 album *Running on Empty*. His 5th album, *Running on Empty* was recorded entirely while Browne was touring, and the songs reflect many of the joys and frustrations of being on the road. Of course, the title of the album (as well as one of the hit songs within the album) has a dual meaning, describing the exhaustion associated with constant travel, and also one of the more mundane challenges of touring: having enough gas to get to the next show.

OBJECTIVES

Upon completion of this lesson, students will:

1. KNOW (KNOWLEDGE):

- How to write and evaluate algebraic expressions to solve real-world problems related to touring costs
- How to use proportions to find an unknown value
- The work of singer-songwriter Jackson Browne

2. MASTERY OBJECTIVE:

- Students will be able to calculate and predict touring costs by writing and evaluating algebraic expressions.

ACTIVITIES

MOTIVATIONAL ACTIVITY

1. Show students **Image 1, Following the Grateful Dead for 30 Years**. Ask students:
 - What might this graph be showing? What do the dots represent? What do the lines represent?
 - Who are the Grateful Dead?
 - Do you think other bands or musicians have similar touring schedules?
2. **Optional:** If students have access to the internet, ask them to research the most recent tour schedule for one of their favorite bands or musicians. Then ask students to share with the class what they found, including how many concerts the tour consists of, and how many cities, states and/or countries are included on the tour.
3. Tell students that touring has always been an avenue for musicians to make a living, if they can sell enough concert tickets. But there are also many expenses involved in touring. Ask students:
 - How would you define the term “expense”?
 - What sort of expenses might be involved in going on a tour? (*Students might suggest touring costs such as food and lodging, the cost of a bus driver and other workers, and so on.*)

PROCEDURE:

1. Show **Image 2, Jackson Browne**. Tell students that in class they will be using math to consider some of the expenses of going on a tour, and will be using musician Jackson Browne as a case study. Explain that Jackson Browne is a singer-songwriter who has been writing and performing music since the 1960s. Jackson Browne's best-selling album is 1977's *Running on Empty*. The album was written and recorded while Browne was on tour, and many of the songs discuss what life is like "on the road."
2. Pass out **Handout - Touring Cost Word Problems** to students (**Teacher's Guide** here). Tell students they will be working through a few word problems as a class on calculating touring costs, before doing individual and group work. Read problem 1 together as a class, and then ask students:
 - What is the important information needed to complete this equation?
 - What mathematical function needs to be used for this calculation?
 - What formula would be used to solve this problem?
 - How many gallons of gasoline were used to travel between these two places?
3. Have students read aloud problem 2 on the handout. Then ask:
 - What information in the previous equation do you require to solve this problem?
 - What mathematical function needs to be used for this calculation?
- What were the touring costs for Jackson Browne to go from Red Rocks Amphitheatre to Universal Amphitheatre?
4. Pass out **Handout - Calculating Jackson Browne's 1978 Tour (First Leg) (Teacher's Guide** here). After reading the introduction of the handout aloud to the class, ask students:
 - Is there a single expression that can be used to calculate each row of the worksheet?
 - What is the necessary information needed to calculate each row?
 - What sort of arithmetic functions are needed to create the calculation?
5. As a class, develop the expression needed to calculate touring costs in the handout. Then show students **Image 3, Expression to Calculate Touring Costs**, and ask students to copy the expression on the appropriate line of the handout.
6. Individually or in small groups, ask students to fill out the chart on the handout using the expression they copied from Image 2. After completing the handout, ask students or student groups to share their answers.
7. Tell students that the costs of bus driver is also a touring expense. Pass out **Handout - Calculating Jackson Browne's 1978 Tour Driver's Pay (First Leg) (Teacher's Guide** here). After reading the introduction of the handout aloud to the class, ask students:
 - Is there a single expression that can be used to calculate each row of the worksheet?

- What is the necessary information needed to calculate each row?
 - What sort of arithmetic functions are needed to create the calculation?
8. As a class, develop the expression needed to calculate bus driver costs in the handout. Then show students **Image 4, Expression to Calculate Cost of Bus Driver**, and ask students to copy the expression on the appropriate line of the handout.
9. Individually or in small groups, asks students to fill out the chart on the handout using the same calculations they went through as a class. Encourage them to see if they can determine the operations needed to do the calculation. After completing the handout, ask students or student groups:
- What operations did you use to complete these calculations?
 - What answers did you get based on these calculations?
 - What was the total touring cost, in 2021 dollars, for gasoline and a tour bus driver for the first leg of Jackson Browne's 1978 tour?

SUMMARY ACTIVITY

1. Pass out **Handout - Creating a Touring Budget (Teacher's Guide** here). As a group or individually, ask students to complete the worksheet. After students complete the worksheet, have them share their answers. Then ask:
- What was the biggest touring cost in your budget?
 - What sort of issues did you experience when you began rounding numbers in Part 2? What does this tell you about some of the possible issues using rounding?
 - What might be some other touring costs that the handout didn't consider?
 - Is there a way to cut down on some of the touring costs?
 - What kinds of risks and unknowns might affect the budget you calculated?
2. Show **Image 5, "Running on Empty" lyrics**. Tell students to read the lyrics, which are the chorus to the Jackson Browne song, "Running on Empty." Then ask students:
- How might these lyrics describe the experience of touring?
 - What feeling might Browne be trying to convey with those lyrics?
 - Are there any words that stand out to you? What might he mean by "running on empty" or "running blind"?

- Based on the calculations you made for this lesson, do you feel like these lyrics might describe the feelings of being on tour? Why or why not?
- Based on the lyrics, would you say there are other sorts of touring costs outside money? (*For example: exhaustion, emotional strain.*)

EXTENSION ACTIVITIES

1. Tell students that Jackson Browne is well known for his environmental activism. He was one of the founding members of Musicians United for Safe Energy (MUSE), which opposes nuclear energy. He is also involved in fighting plastic pollution, and has received a Lifetime Environmental Achievement Award in 2010 for his efforts to make his tours more “green.” Complete the worksheet in **Extension Activity - Calculating The Environmental Cost of Jackson Browne’s 1978** tour to see how much CO2 Browne saves by using other modes of transportation (**Teacher’s Guide** here).
2. Imagine that you are a popular music artist who is about to embark on a national tour. Use **Extension Activity - Design a Tour Bus** to design and sketch your own personalized tour bus, and examine this site for inspiration: <https://gogocharters.com/blog/inside-celebrity-tour-buses>.

STANDARDS

COMMON CORE STATE STANDARDS*Expressions and Equations*

CCSS/Math.Content.6.EE.A.2: Write, read, and evaluate expressions in which letters stand for numbers.

Ratios and Proportional Relationships

CCSS/Math.Content.6.RP.A.3: Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

College and Career Readiness Anchor Standards for Reading (K-12)

Craft and Structure 4: Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

Integration of Knowledge and Ideas 7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

College and Career Readiness Anchor Standards for Speaking and Listening (K-12)

Comprehension & Collaboration 2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Presentation of Knowledge 4: Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

College and Career Readiness Anchor Standards for Language (K-12)

Language 1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Vocabulary Acquisition and Use 6: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

RESOURCES

HANDOUTS

- Handout - Touring Cost Word Problems
- Handout - Touring Cost Word Problems (Teacher's Guide)
- Handout - Calculating Jackson Browne's 1978 (First Leg)
- Handout - Calculating Jackson Browne's 1978 (First Leg) (Teacher's Guide)
- Handout - Calculating Jackson Browne's 1978 Tour Driver's Pay (First Leg)
- Handout - Calculating Jackson Browne's 1978 Tour Driver's Pay (First Leg) (Teacher's Guide)
- Handout - Creating a Touring Budget
- Handout - Creating a Touring Budget (Teacher's Guide)
- Extension Activity - Calculating The Environmental Cost of Jackson Browne's 1978 tour
- Extension Activity - Calculating The Environmental Cost of Jackson Browne's 1978 tour (Teacher's Guide)
- Extension Activity - Design a Tour Bus